



# Lesson Plan: What's in Your Stream?

## Overview

In this lesson students will learn about the impact of the environment on the rivers and streams in Pennsylvania through online resources and scientific investigation of water quality through hands-on fieldwork. The suggested time frame for this lesson is three 50-minute class periods.

## Content Objectives

Students will know that

- a watershed is a land area through which water drains
- a watershed's shape is determined by the surrounding terrain
- people's actions affect the quality of a watershed
- the physical characteristics of a stream determine the types of organisms found there

## Process Objectives

Students will be able to

- describe a watershed and discuss how it affects water quality
- identify causes of changes and pollution in the water of a stream
- accurately follow directions and complete water testing
- collect aquatic insects and identify them using the chart and pictures and come up with an index value
- analyze differences in the water quality of a stream

## Assessment Strategies

- Evaluation of water testing and participation in class discussions
- Observation of student's participation in the data collection process
- Presentation on causes of pollution in streams

## Grade Level: 9-12

## Suggested Time

Three 50-minute class periods

## Multimedia Resources

- [Pennsylvania Stream Water Treatment Systems](#) QuickTime Video

## Materials

- [What's in Your Stream? Resources](#) Word Document
- Large sheets of paper for class discussion (Part 1)
- Water testing kits for testing nitrates, pH, chloride
- Thermometer suited for use in a stream
- Waders or clothing suitable for wading in streams
- Gathering nets for catching aquatic insects
- Sieves, white dishpans, magnifying glasses
- Worksheets for recording information and clipboards
- Plastic jug for used water-testing chemicals
- [Penn State College of Agricultural Sciences Watersheds Pamphlet](#)
- [Locate Your Watershed](#)
- [Biotic Index Card](#)
- [US Geological Survey \(USGS\) USGS Fact Sheet, Monitoring Our Rivers and Streams](#)
- [USGS Water Science for Schools, Common Water Measurements](#)
- [The Stream Study](#)
- [Effects of Urbanization on Water Quality](#)

## Procedures

### Part I: Introduction (1, 50 Minute Class Period)

1. Begin the lesson by asking students if they have a river, creek or stream near their homes and where they think the water comes from that enters the stream. You may have the students review the [Penn State College of Agricultural Sciences Watersheds Pamphlet](#) the day before class (<http://pubs.cas.psu.edu/freepubs/pdfs/uh149.pdf>).
2. Watershed Discussion: Divide the students into groups of 4 or 5. Provide each group with the student handout, "Watershed Discussion" and the [US Geological Survey \(USGS\) USGS Fact Sheet, Monitoring Our Rivers and Streams](#) document. Have the students locate their watershed ([Locate Your Watershed](#)). Give the students 25 minutes for discussion on the questions below. Each group should identify a recorder to take notes and have the group prepared to share what they talked about.

Questions:

What is the watershed like that surrounds your school/community?

How do people affect their watershed?

What factors affect your water quality?

What can be done to reduce our impact on watersheds?

For example: What happens when a new shopping center is built in your town? (Resource: [Effects of Urbanization on Water Quality](#))

What happens when there is a large farming community? What happens when a waste site is built nearby?

3. Conclude the discussion by having students share their conclusions with the class by writing major ideas on a poster size paper for each group to hang in the classroom and wrap up by asking what can be done about the problem.

### Part II: Water Testing (1, 50 Minute Class Period)

4. Share the

[Pennsylvania Stream Water Treatment Systems](#) QuickTime Video

either as a group or have students view it on individual computers.

5. Discuss water quality testing with the class. Read over the teacher notes and lesson and review the processes of water testing and biotic indexing. Share the [USGS Water Science for Schools, Common Water Measurements](#) handout. You may also review [The Stream Study](#) site for collection techniques and illustrations of macroinvertebrates. The site also has a sample record and assessment card for macroinvertebrates that could be used to collect data.
6. Determine which students will be doing what tests. Divide them out so that everyone has at least one job. Have the students who will be doing the chemical testing practice on tap water. This will give them some practice following the directions included in each testing kit and you can address any problems ahead of time.
7. Review with students how to use the insect collecting equipment and review the aquatic insect key and [Biotic Index Card](#). Note: You may want to print the cards in color to see the insects characteristics.
8. Choose a local stream that you would be able to visit and perform testing on both near its headwaters and after it has passed through agricultural land and pastures, for example. Make sure you can prepare all of the materials ahead of time. Optional: If you do not have a nearby stream, you may want to use real-time data from the [US Geological Survey \(USGS\) USGS Fact Sheet, Monitoring Our Rivers and Streams](#).

### **Part III: Collection (1, 50 Minute Class Period)**

9. Take the students to the stream near its headwaters (or visit the USGS web site in Part 2) and get them started on their testing. (Everyone should know what to do from the previous class.) Stress safety making sure that nobody gets hurt getting in and out of the stream. Also make sure that all used chemicals are deposited in the plastic jug (which should be labeled "toxic").
10. Have students carefully record all of their information. Monitor the students to be sure that they are performing the tests correctly. As they are collecting their data, have the students talk about what they are finding and how it is important.
11. While at the site have the students informally share the data they have collected and discuss whether the stream/river/creek is polluted and why.

### **Part IV: Group Presentations (1 or 2, 50 Minute Class Periods)**

12. Using groups of four or five have students create a presentation using PowerPoint or other medium to show the results of their data collection including major issues and future directions.